Z320 SERVICE MANUAL

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SECTION B

Operating Instructions after page 26
of Service Manual

INSTRUCTIONS FOR ADJUSTMENT

Under normal operating conditions, there should be no need for the operator to perform any internal adjustments. However, the following aspects of performance may be checked:

Maximum speed	2900 RPM
Time required to reach maximum speed	less than 90 seconds
Deceleration time (full braking)	less than 90 seconds
*Tachometer accuracy	100 RPM

If any of the above performance characteristics are found to be lacking, they may be readjusted via potentiometers on the main circuit board as described in sections A and B of this chapter.

* Requires use of additional external equipment, as set forth in section B4 of this chapter. This test should be performed every year or 3.

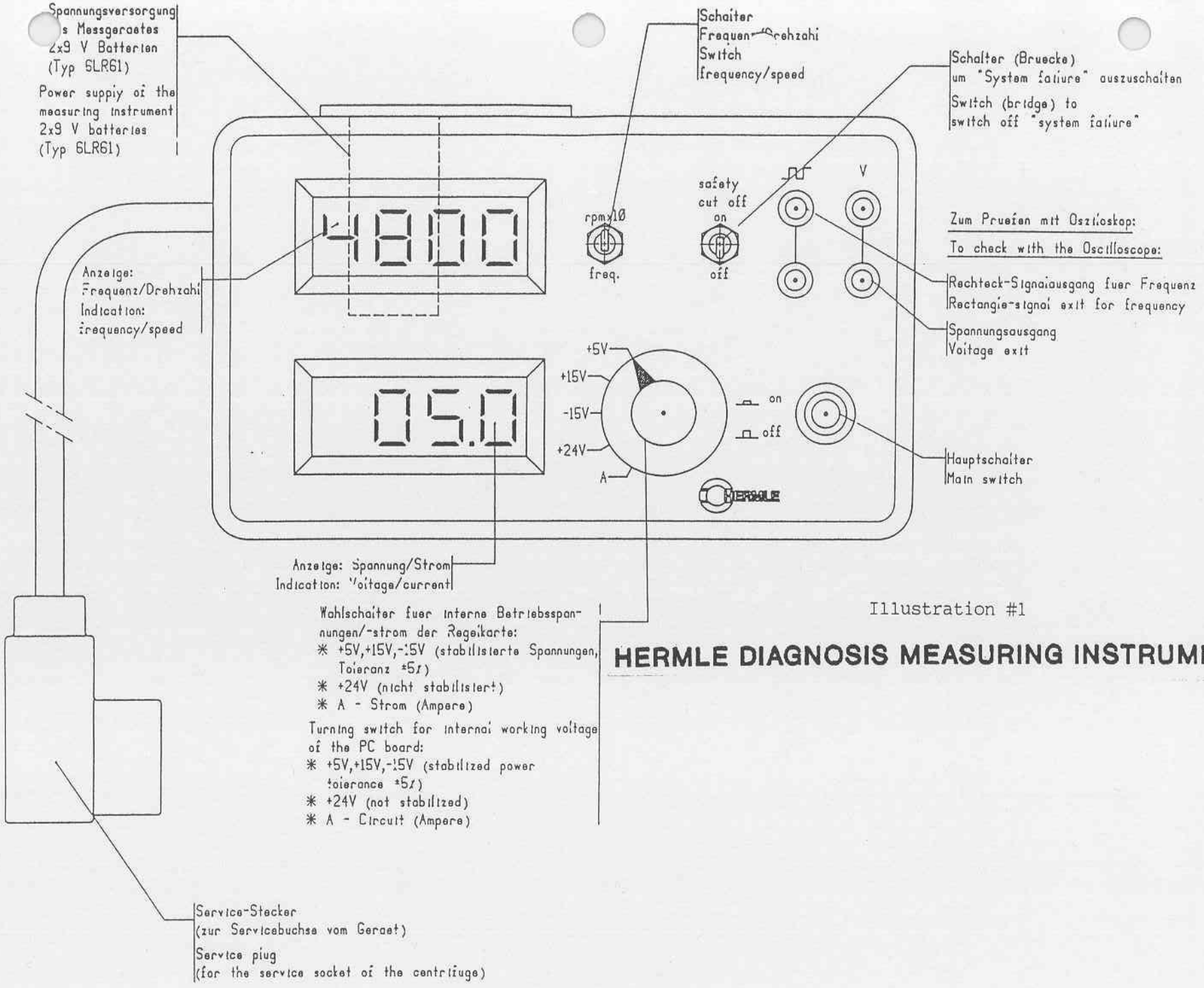


Illustration #1

HERMLE DIAGNOSIS MEASURING INSTRUMENT

Service manual Z 320

Remarks to the following instructions of adjustment

Version A

If a Hermle diagnosis - measuring instrument with corresponding adapter is available with you

Version B

With a recommended measuring instrument like

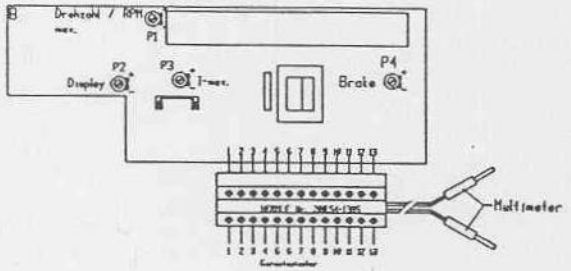
Fluke 75 Multimeter

Soar : Digital Multimeter
D2M2 series model 4050
with Hermle adapter No. 200.S4-1385

and external speed measuring instrument

PC Board HE 85.00.03 (Z320)

Illustration #2



see next page

1. Connect the centrifuge to the measuring instrument by means of the adapter.

Set all potentiometers "P1-P4" to the left limit position

A. With Hermle diagnosis measuring instrument and adapter

Set the following on the measuring instrument:

- Set switch "rpm x 10 - freq" to position "rpm x 10"
- Safety cut off: as you like (No function)
- Set switch +5V , +15V etc. to position A
- Switch on the measuring instrument

A2. Adjustment of the motor current: Potentiometer P3 = I max:

- Lock the motor by means of the Hermle clamping device
- for centrifuges upto serial no..... "motor shaft without driving pin " see supplementary page in the appendix.
- Close the Lid
- Set the knob "speed" to position 10
- Start the Centrifuge by means of the timer
- Wait for abt. 5 sec.
- Set the current to 1.2 Ampere
- Switch off the centrifuge and remove the clamping device

Attention:
If the motor is locked too long, there is danger of overheating

Recommended measuring instruments:

Hermle diagnosis- measuring instrument with adapter
or alternatively
Fluke 75 Multimeter

Soar : Digital Multimeter
D2M2 series model 4050
with Hermle adapter no. 200.S4-1385

Note:
Compare to layout diagram no. S 230

ATTENTION !

To avoid any short circuit, as well as any damage on the PCB, use a suitable insulated screwdriver.
DIN 7457 2.5 x 75 mm
or a insulated electronic adjustment screwdriver
(for example of (Messrs. "Spectrol")

Inner Chamber - Z320

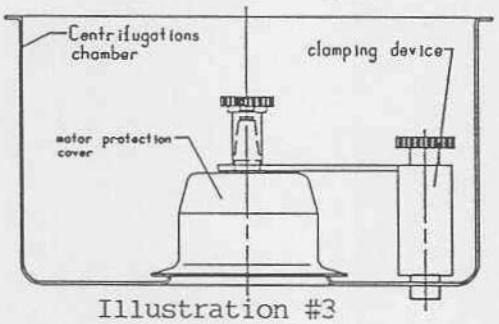


Illustration #3

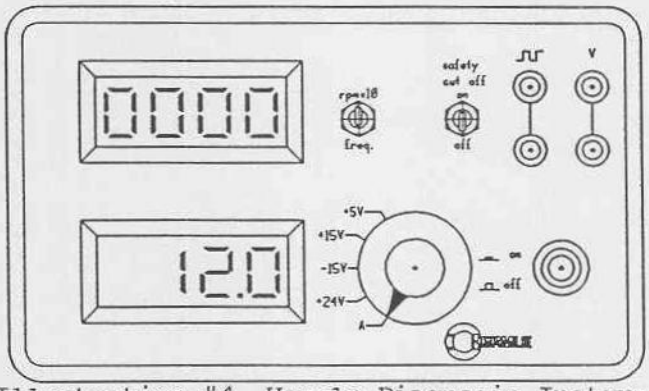


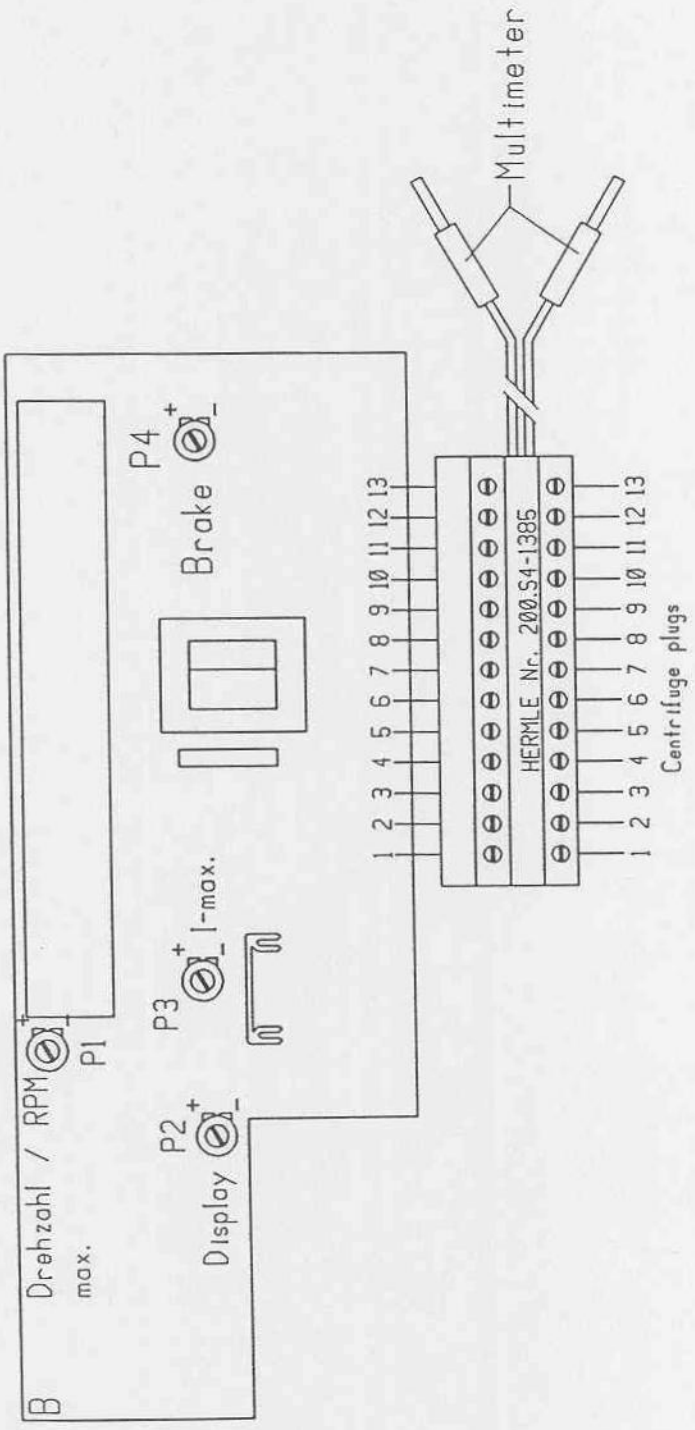
Illustration #4 Hermle Diagnosis Instrument

The Hermle measuring instrument shows now 10 times the value of the current. Adjust the centrifuge until the measuring instrument indicates 12.0 .
Upon adjustment of the current value, please take care that the run-up barrier is overcome.
Pay attention to exact adjustment 1.2 Ampere.

Schematic Diagram of the PC Board

- PC Board HE 85.00.03 (Z320) -

Illusration #5



A3. Adjustment of the speed limit
Potentiometer P1 = n max.

- Speed limit has to be adjusted to 10 000 rpm by means of potentiometer P1
- Place rotor 220.45 V01 in the centrifuge.
- Close the lid
- Set the speed to position 10 on the scale (front panel)
- Start the centrifuge
- Adjust the centrifuge with potentiometer P1 in such a way that the measuring instrument shows you 1000 - 1002 .
  This corresponds to an actual maximum speed of 10 000 - 10 020 rpm.

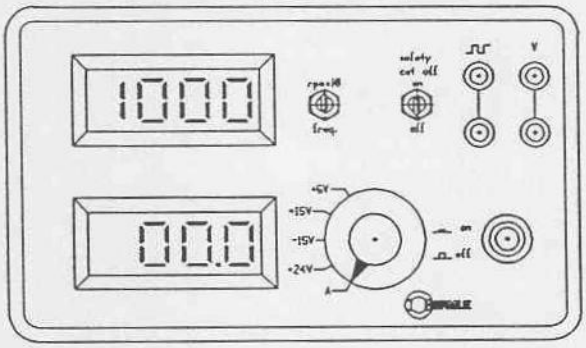
A4. Adjustment of the digital indication
Potentiometer
P2 - Range - Adjust.

- After adjustment of the speed limit to 10 000 rpm, (described in A3) adjust the digital indication by means of potentiometer P2 in such a way that the measured actual speed is equal to the speed indicated by the digital indication.

A5. Adjustment of the braking current
Potentiometer P4 Brake

- Place the heaviest rotor in the centrifuge.
- Close the lid
- Set the speed and the braking intensity to position 10 on the scale (front panel).
- Start the centrifuge with the timer .
- When the rotor has reached its maximum speed, set the timer back to "0" and adjust the braking current to 300 mA with the potentiometer P4.
- Switch off the centrifuge, unplug the power cord.
- If the respective rotor is not available, proceed as described, but without rotor.

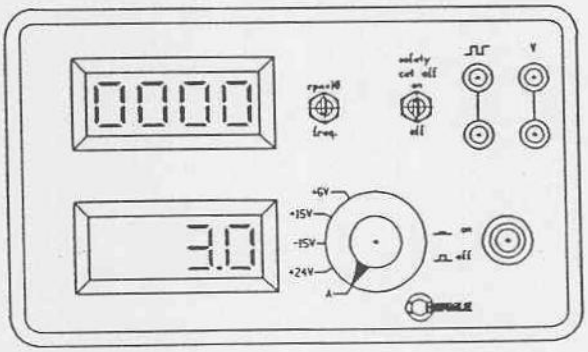
Illustration #6
Hermle Diagnosis Instrument



Attention :

Take care that the turning switch is in the correct position: rpm x 10.

Illustration #7
Hermle Diagnosis Instrument



The Hermle measuring instrument indicates you now 10 times the value of the current.
Adjust the centrifuge until the measuring instrument indicates 3.0 .

A5. Adjustment of the braking current
Potentiometer P4 Brake

- Place the heaviest rotor in the centrifuge.
- Close the lid
- Set the speed and the braking intensity to position 10 on the scale (front panel).
- Start the centrifuge with the timer .
- When the rotor has reached its maximum speed, set the timer back to "0" and adjust the braking current to 300 mA with the potentiometer P4.
- Switch off the centrifuge, unplug the power cord.

Final adjustments as described under A6 and A7.

A6. Seal all potentiometers with sealing lacquer.

- Remove the measuring adapters.

- Test run.

A7. Adjustment of the imbalance switch off:

- Turning the adjustment screw clockwise, makes the imbalance switch off more sensible.
- Turning the adjustment screw counter-clockwise, makes the imbalance switch off less sensible.

Table #1

Adjustment of imbalance with a liquid

rotor no.	switch off at	does still not switch off at
220.72 V01	20 gr.	15 gr.
220.36 V01	16 gr.	13 gr.
220.37 V01	2 x 8 gr.	2 x 6 gr.
220.42 V01	9 gr.	7 gr.

Note:

How to settle the imbalance indication

If the centrifuge switches off due to imbalance, this is indicated by a blinking of the digital indication.

When the rotor is stationary, open the lid and closeit again. this settles the inbalance indication.

Note :

At the values indicated in the column " does still not switch off at " the centrifuge should maintain normal operation

At the values indicated in the column "switch off at" the centrifuge should - if correctly adjusted - switch off upon reaching a speed of 200-400 rpm.

Illustration #8
View of Z320 Motor

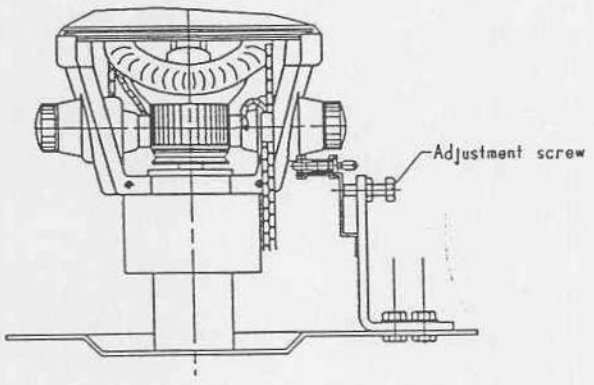
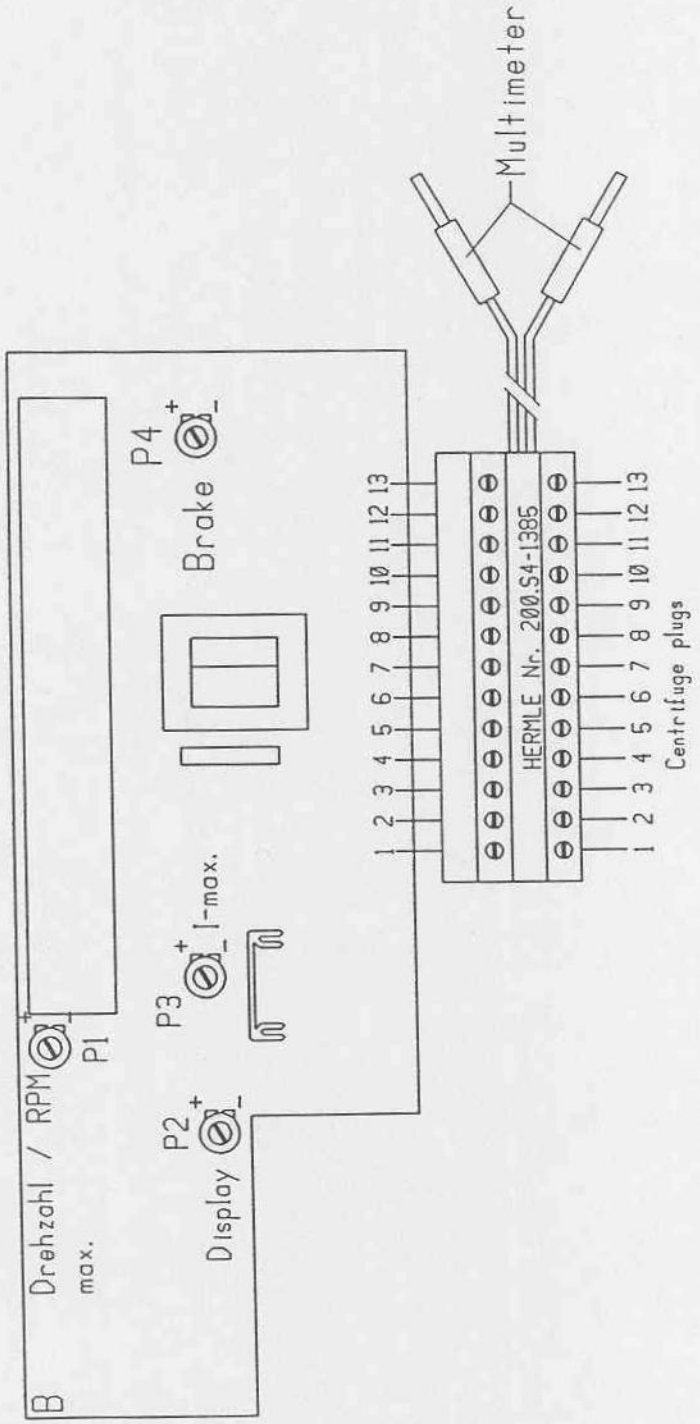
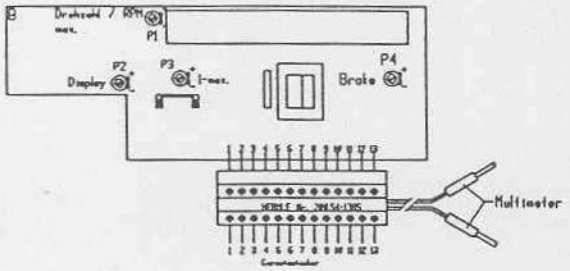


Illustration #9
Schematic Diagram of the PC Board
- PC Board HE 85.00.03 (Z320) -



PC Board HE 85.00.03 (Z320)

Illustration #10



see next page

1. Connect the centrifuge to the measuring instrument by means of the adapter.

   Set all potentiometers "P1-P4" to the left limit position

B. Alternative without Hermle diagnosis measuring instrument , but with Hermle adapter No. 200.S4-1385 and with an external speed measuring instrument.

B2. Adjustment of the motor current: Potentiometer P3 = I max:

- Lock the motor by means of the Hermle clamping device
- for centrifuges upto the serial no..... "motor shaft without driving pin " see supplementary page in the appendix.
- Close the lid
- Set the knob "speed" to position 10
- Start the centrifuge by means of the timer
- Wait for abt. 5 sec.
- Set the current to 1.2 Ampere
- Switch off the centrifuge and remove the clamping device

Attention:
If the motor is locked too long, there is danger of overheating

Recommended measuring instruments:

Alternatively
Fluke 75 Multimeter

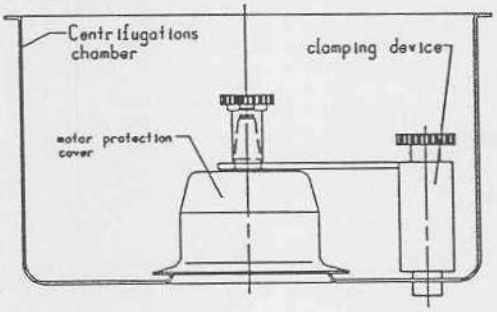
Soar : Digital Multimeter
D2M2 series model 4050
with Hermle adapter no. 200.S4-1385

Note:
Compare to layout diagram no. S 230

ATTENTION !

To avoid any short circuit, as well as any damage on the PCB, use a suitable insulated screwdriver.
DIN 7457 2.5 x 75 mm
or a insulated electronic adjustment screwdriver (for example of (Messrs. "Spectrol")

Illustration #11
Inner Chamber - Z320



Upon adjustment of the current value, please take care that the run-up barrier is overcome.
Pay attention to exact adjustment 1.2 Ampere.

B3. Adjustment of the speed limit
Potentiometer P1=n max.

- Speed limit has to be adjusted to 10 000 rpm by means of potentiometer **P1**

- For that aim, use an external speed measuring instrument.

- Place rotor no. 220.45 V01 in the centrifuge

- Close the lid

- Set the speed to position 10 on the scale (front panel)

- Start the centrifuge.

- When using a stroboscope you should set the adjustment potentiometer P1 to the limit stop clockwise. by turning it

Set the stroboscope to the final speed of 10 000 rpm By turning the 10000 rpm. potentiometer P1 counter - clockwise, the centrifuge is adjusted to the maximum speed allowed for the unit.

B4. Adjustment of the digital indication
Potentiometer
P2 - Range - Adjust.

- After adjustment of the speed l;imit to 10 000 rpm, (described in A3) adjust the digital indication by means of potentiometer P2 in such a way that the measured actual speed is equal to the speed indication by the digital indicated.

- If the respective rotor is not available, proceed as described, but without rotor.

Note :

Recommended external speed measuring instrument:

Stroboscope - e.g "TURO - STROB PICOSTROB 331"
Flash - light - stroboscope, frequency range:
3.3 - 300 cyc.
200 - 18 000 rpm

Attention:

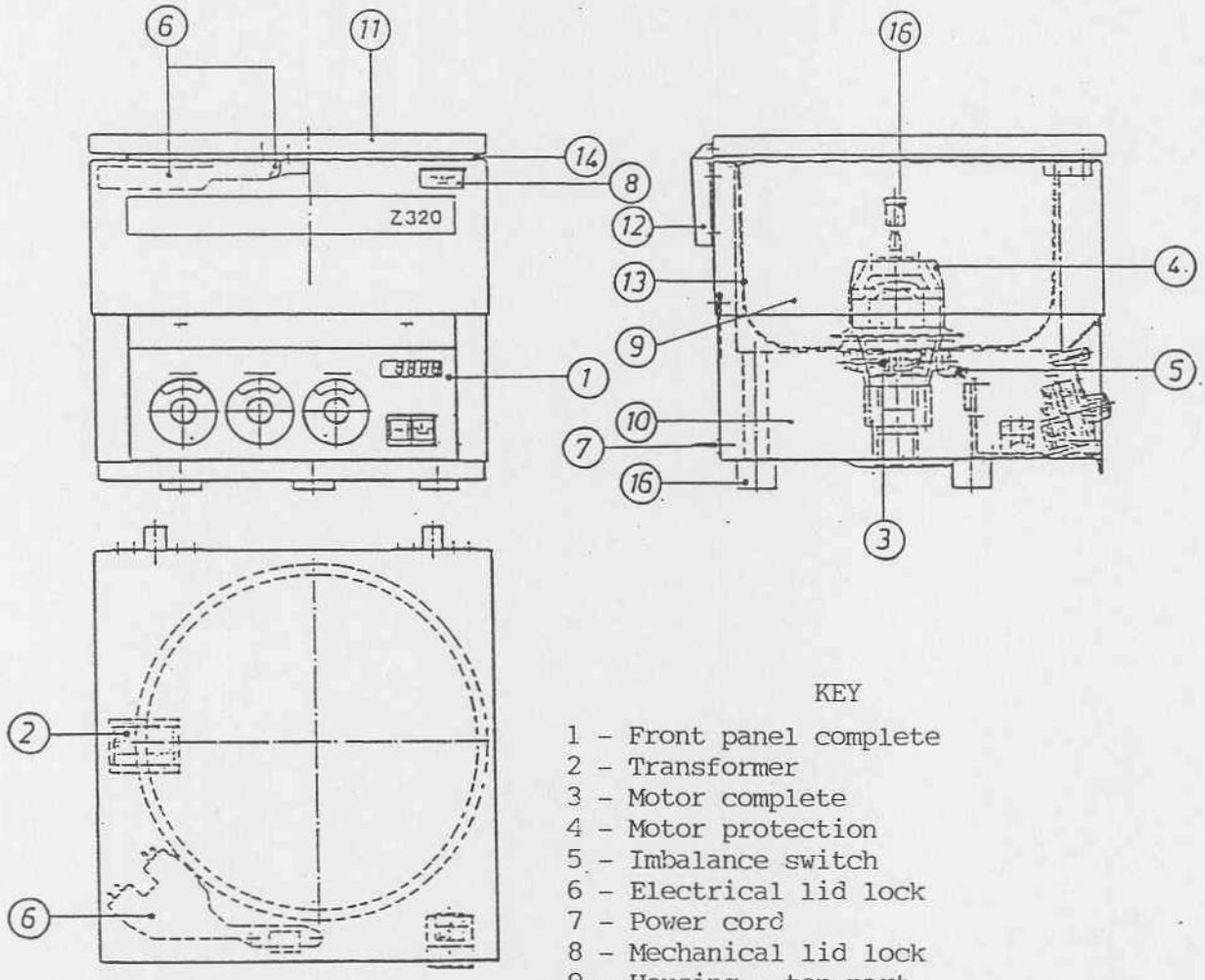
Upon adjustment with a stroboscope, ensure to have set the correct frequency range.

There is a possibility of very exact adjustment when measuring the speed at the collector of the motor .

To avoid any faulty adjustment, we recommend to mark the collector with a black pen

COMPOSITE ILLUSTRATION OF Z320 EQUIPMENT

Illustration #12



KEY

1 - Front panel complete
2 - Transformer
3 - Motor complete
4 - Motor protection
5 - Imbalance switch
6 - Electrical lid lock
7 - Power cord
8 - Mechanical lid lock
9 - Housing - top part
10 - Housing - bottom part
11 - Lid complete
12 - Hinge
13 - Rotor chamber
14 - Rubber gasket
15 - Hat-shaped nut for securing rotor
16 - Rubber feet

Please see next page for descriptions of the above listings

SPARE PARTS LIST
Z 320

Part No.	Description
	****** Position no: 01 ******
70.0031	FRONT PANEL COMPL. WITH PC BOARD 220 V / 240 V , 50 HZ
70.0197	FRONT PANEL COMPL. (DITO) EPPENDORF DESIGN 220 V / 240 V , 20 HZ / 60 HZ
HE 85.00.03	CONTROL-UNIT
25.0021	FUSE 1.25 A MT
38.0083	PUSH BUTTON-POWER COLOUR:GREEN
38.0123	PUSH BUTTON-LID COLOUR:GLASS-WHITE
70.0028	KNOB WITH SCALE BRAKING INTENSITY
70.0029	KNOB WITH SCALE SPEED
35.0004	TIMER 60 MIN, 220V/50HZ
40.0095	INTERFERENCE SUPPRESSOR FILTER 220 V/ 240 V
70.0032	FRONT PANEL COMPL. WITH PC BOARD 115 V / 220 V , 60 HZ
25.0023	FUSES 2.5 AT
35.0017	TIMER 60 HZ
	****** Position no: 02
39.0021	TRANSFORMER 115 V / 100 VA
39.0018	TRANSFORMER 240 V / 220 VA

Part No.	Description
	****** Position no: 03
70.0033	MOTOR COMPLETE WITH ANTI-VIBRATION ELEMENT AND FLANGE
243.00.40.02	MOTOR
32.0050	CARBON BRUSH
	****** Position no: 04
70.0034	MOTOR PROTECTION COV WITH SCREWS
70.0110	IMBALANCE SWITCH COMPLETE
38.0081	MICROSWITCH
	****** Position no: 06
23.5056	ELECTRICAL LID LOCK 50/60 HZ
70.0038	LID LATCH
	****** Position no: 07
42.0158	POWER CORD
42.0108	POWER CORD 115 V /UL VERSION
	****** Position no: 08
250.04.00.03	MECHANICAL LID LOCK COMPLETE
	****** Position no: 09
243.00.13.00	HOUSING-TOP PART ONLY METAL PART
	****** Position no: 10
243.00.14.10	HOUSING-BOTTOM PART ONLY METAL PART
	****** Position no: 11

Part No.	Description
243.00.16.02	LID COMPLETE WITH HINGE
243.00.19.02	LID COMPLETE EPPENDORF DESIGN WITH HINGE
	****** Position no: 12
243.00.41.03	HINGE
	****** Position no: 13
243.00.03.01	ROTOR CHAMBER
	****** Position no: 14
70.0184	RUBBER GASKET FOR ROTOR CHAMBER
	****** Position no: 15
229.00.37.14	HAT-SHAPED NUT FOR SECURING ROTOR
	****** Position no: 16
26.5034	RUBBER FEET FOR CENTRIFUGE
229.00.48.14	LID RELEASE HOOK FOR EMERGENCY
70.0167	ASSEMBLING ACCESS. FOR HOUSING FOR CENTRIFUGE CASINGS

LISTING OF SEMICONDUCTORS FOR THE Z320

Table #2

Component	Type	Manufacturer	Hermle-Id.No.
Diode	1N4148	Philips	60.0259
Diode	1N4007	General Instr.	60.0260
Z-Diode	BZX79C12	Philips	60.0258
Z-Diode	BZX79C9.1	Philips	60.0256
Rectifier	DF01M	General Instr.	60.0248
Rectifier	KBP06M	General Instr.	60.0249
Display	TDSR 5150	Telefunken	60.0265
Transistor	BD 136-16	Telefunken	60.0244
Transistor	BC 547B	Siemens	60.0241
Transistor	BC 257B	Siemens	60.0242
SCR	SC 142M	General Electric	60.0245
SCR	T7.5N6F0B	Telefunken	60.0247
IC	MC 7805C	Motorola	60.0234
IC	TDA 2086A	Plessey	60.0179
IC	LM 358N	Texas Instr.	60.0177
IC	LM 324N	Texas Instr.	60.0172
IC	HEF 4011BP	Philips	60.0187
IC	HEF 4052BP	Philips	60.0183
IC	ICL 7107CPL	Intersil	60.0178

Deceleration and acceleration curves

Chart #1

Model : Z 320
Rotor : 220.59 V02 Bucket 8 x 45.5060

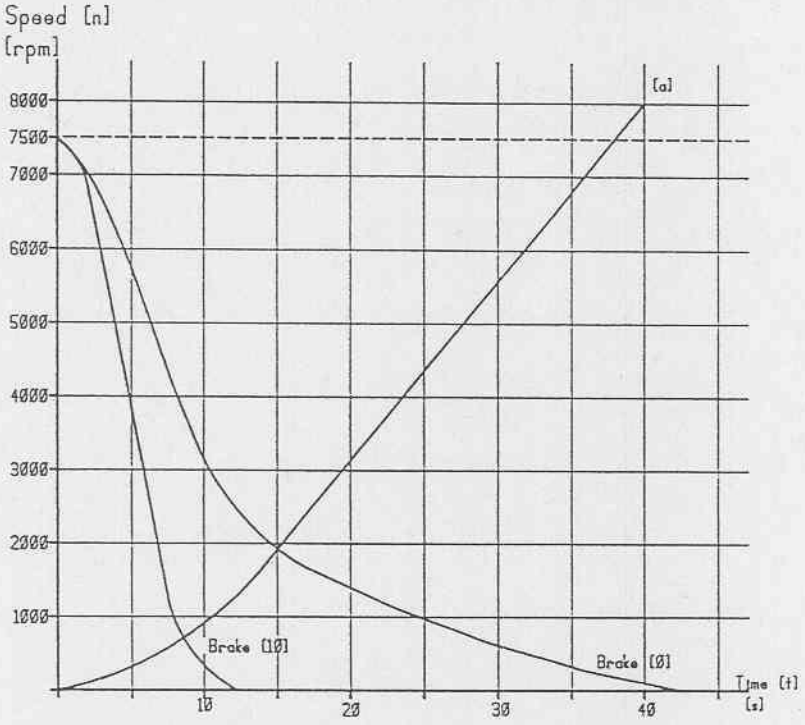
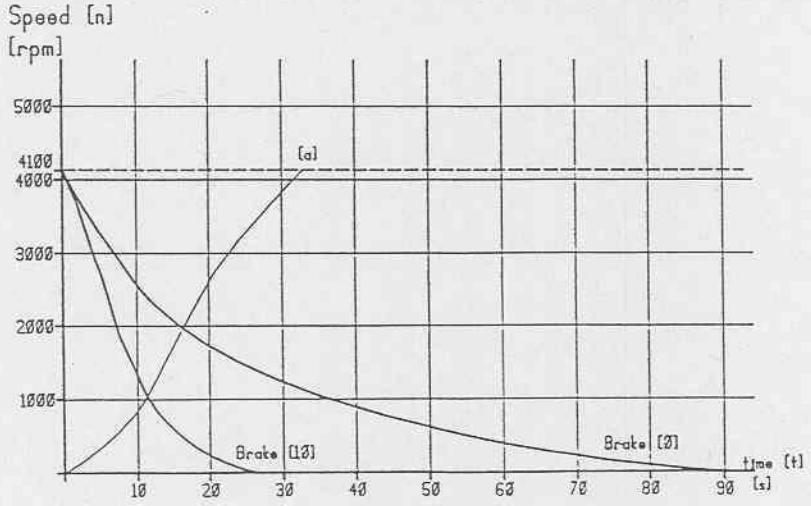


Chart #2

Model : Z 320
Rotor : 220.72 V01 Bucket 4 x 220.72.03.03



Deceleration and acceleration curvs

Chart #3

Model : Z 320
Rotor : 220.42 V01 Bucket 8 x 220.42 V04

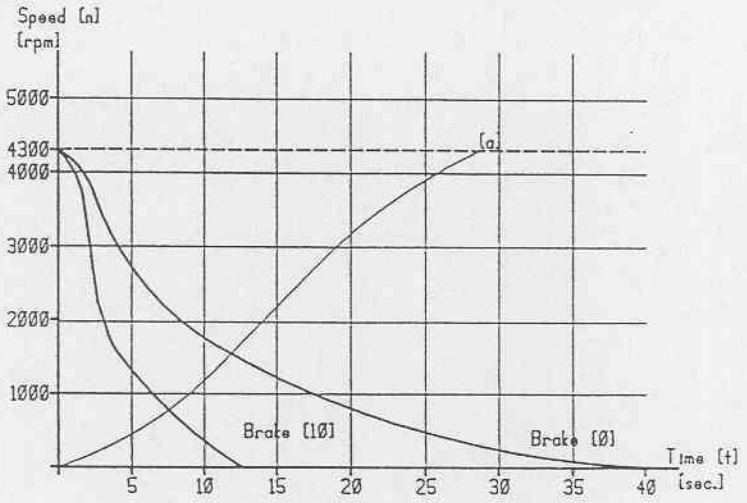
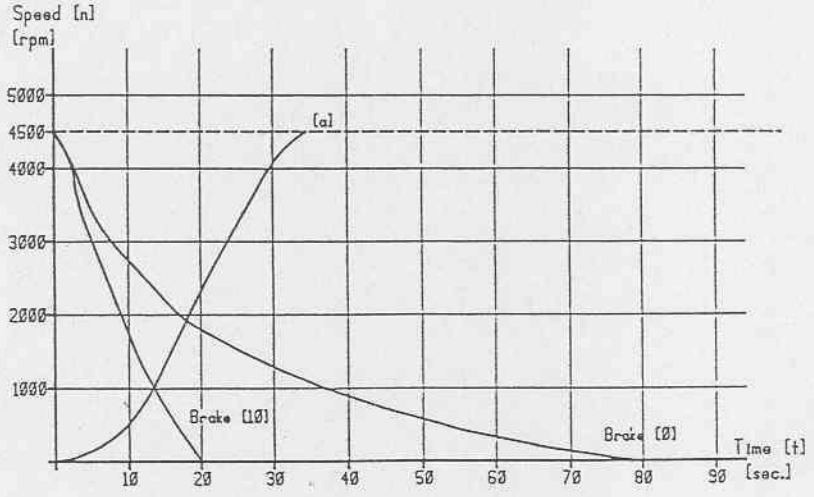


Chart #4

Model : Z 320
Rotor : 220.37 V01 Bucket 12 x 220.42 V04



Deceleration and accleration curves

Chart #5

Model : Z 320
Rotor : 220.43 V01 Bucket 12 x 37.5039

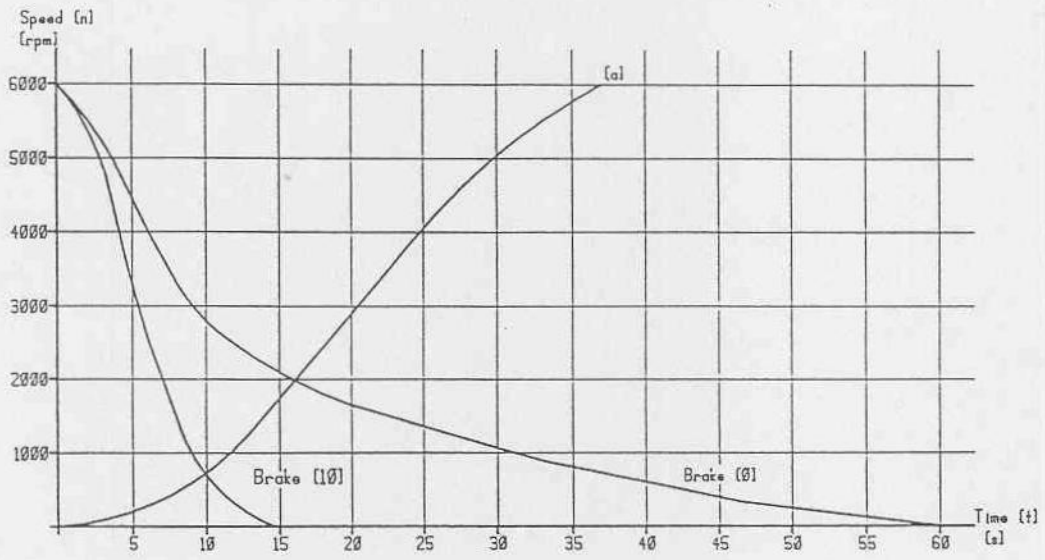
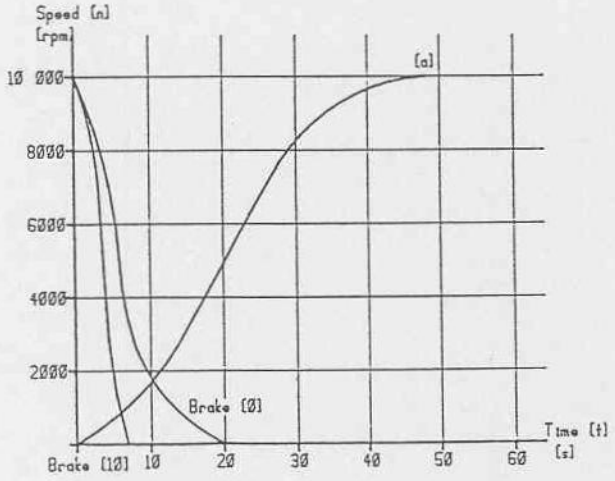


Chart #6

Model : Z 320
Rotor : 220.45 V01 Bucket 6 x 45.5060



Deceleration and acceleration curves

Chart #7

Model : Z 320

Rotor : 220.50 V01 Bucket : 220.50.03.03

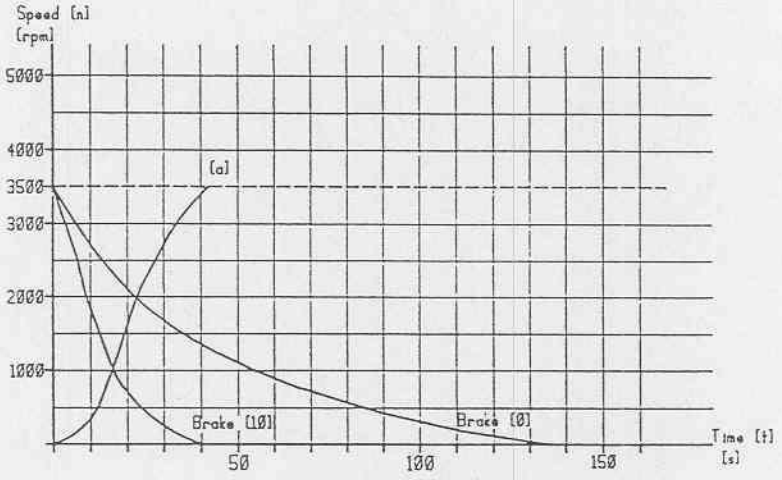


Chart #8

Model : Z 320

Rotor : 220.58 V02 Bucket : -

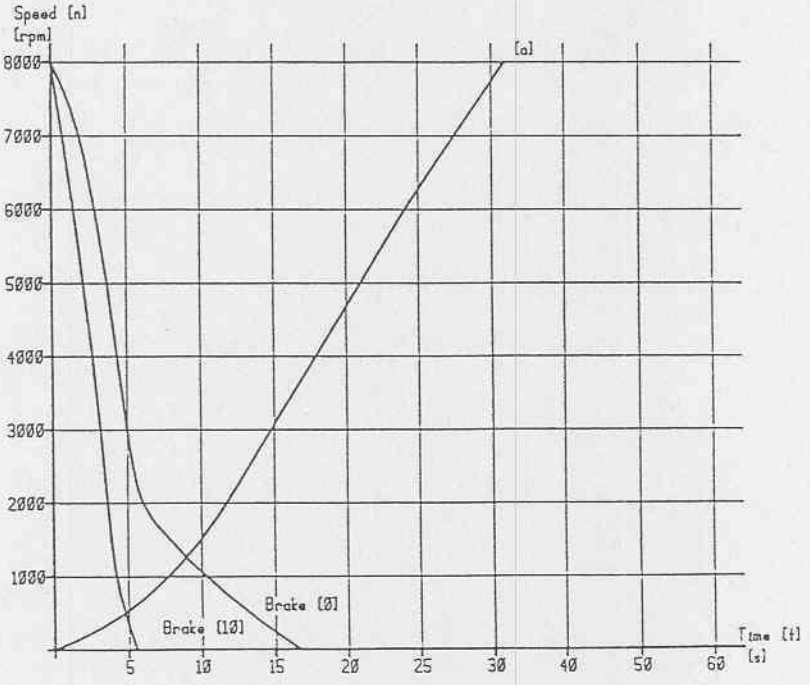


Chart #9

Model Z 320

Rotor 220.42 V01 Bucket 220.42 V04

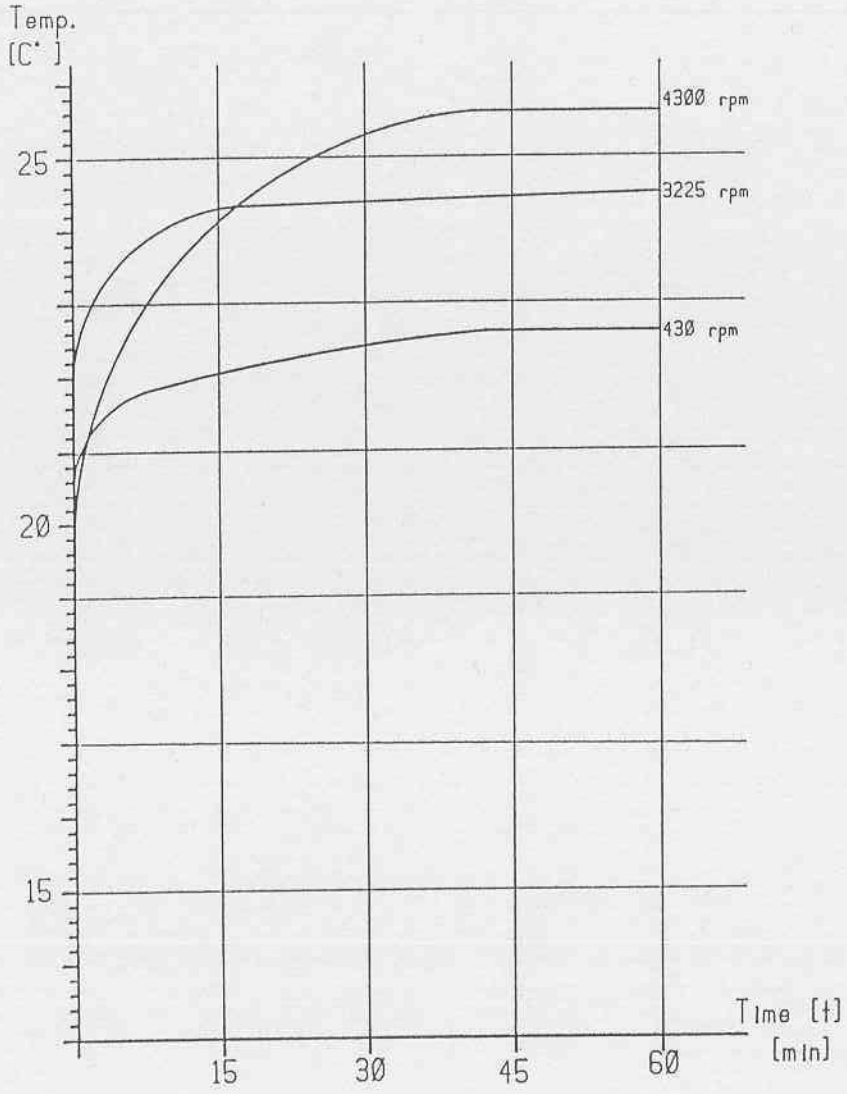


Chart #10

Model Z 320

Rotor 220.72 V01 Bucket 220.72.03.03

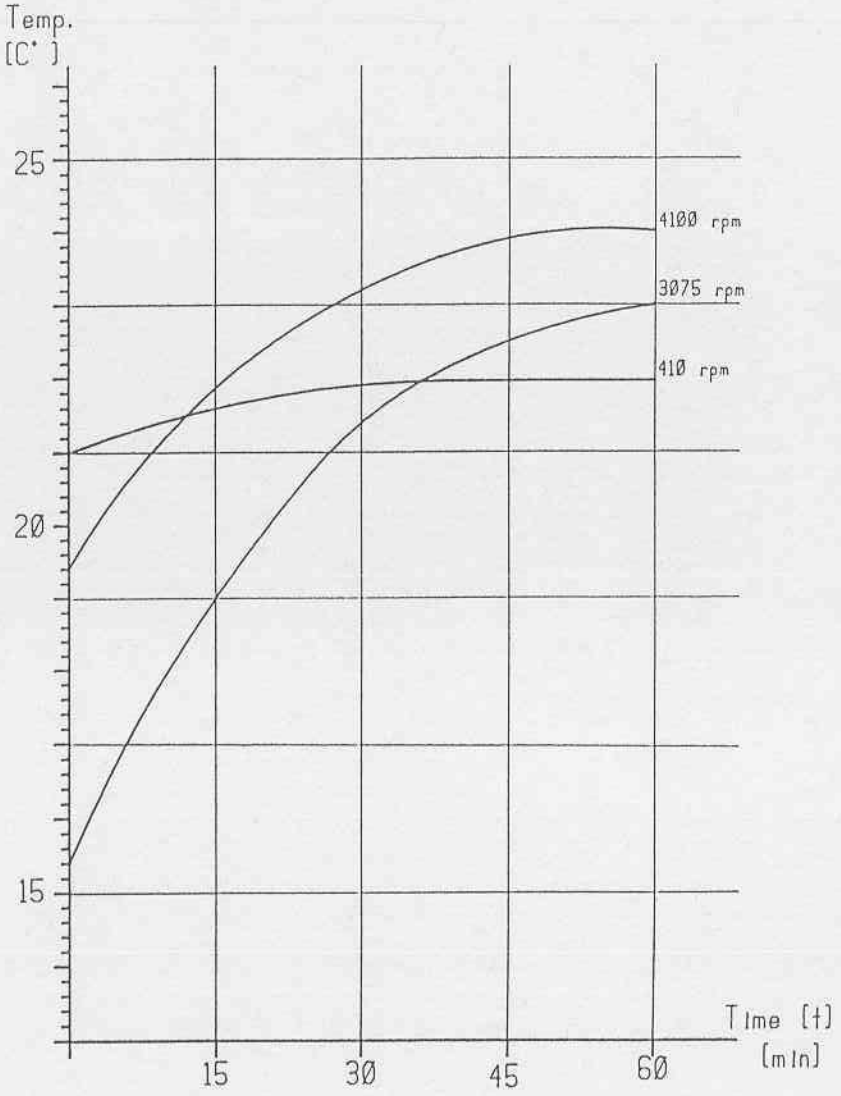


Chart #11

Model Z 320

Rotor 220.59 V02 Bucket 45.5060

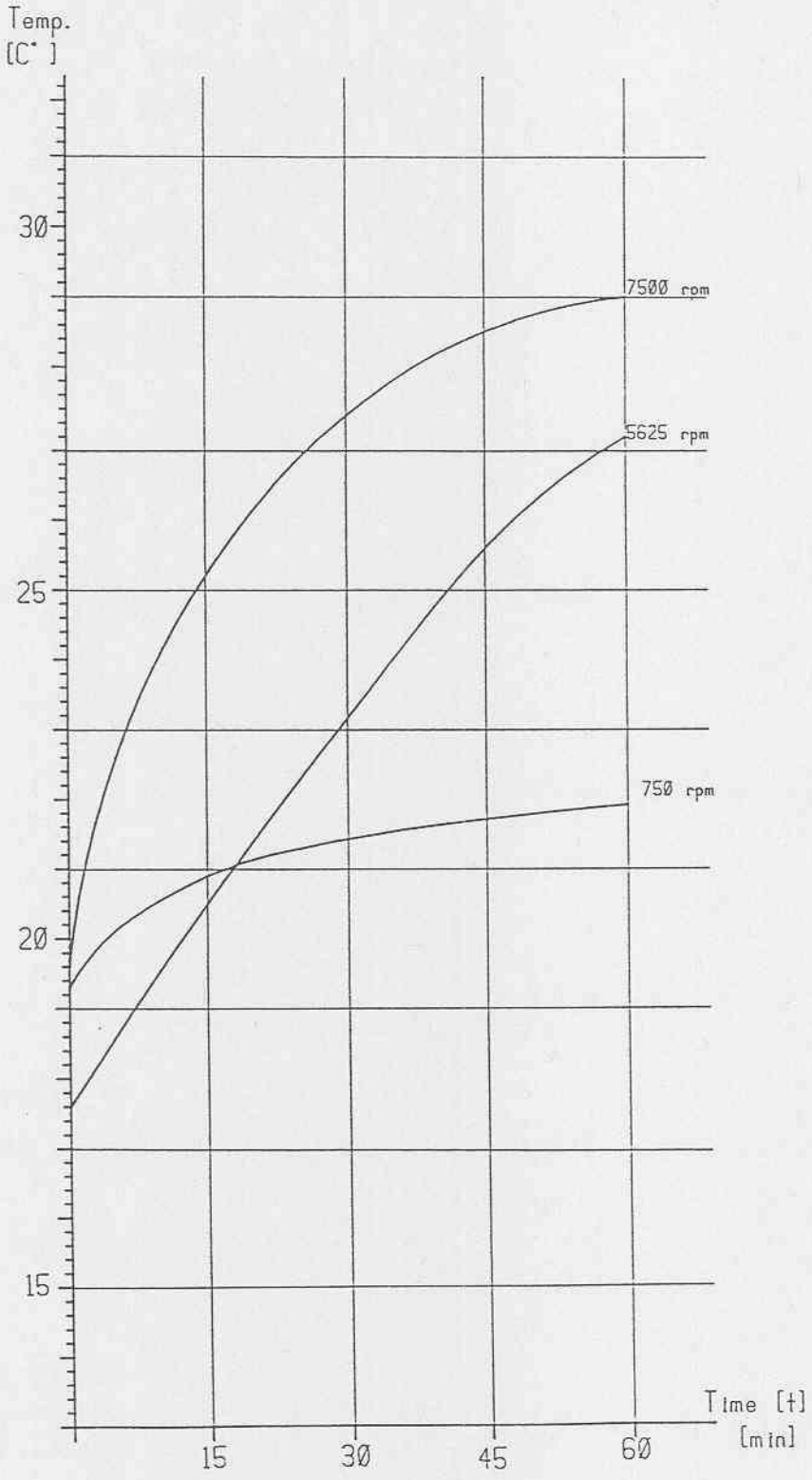


Chart #12

Temperature diagram

Model Z 320

Rotor 220.37 V01 Bucket 220.42 V04

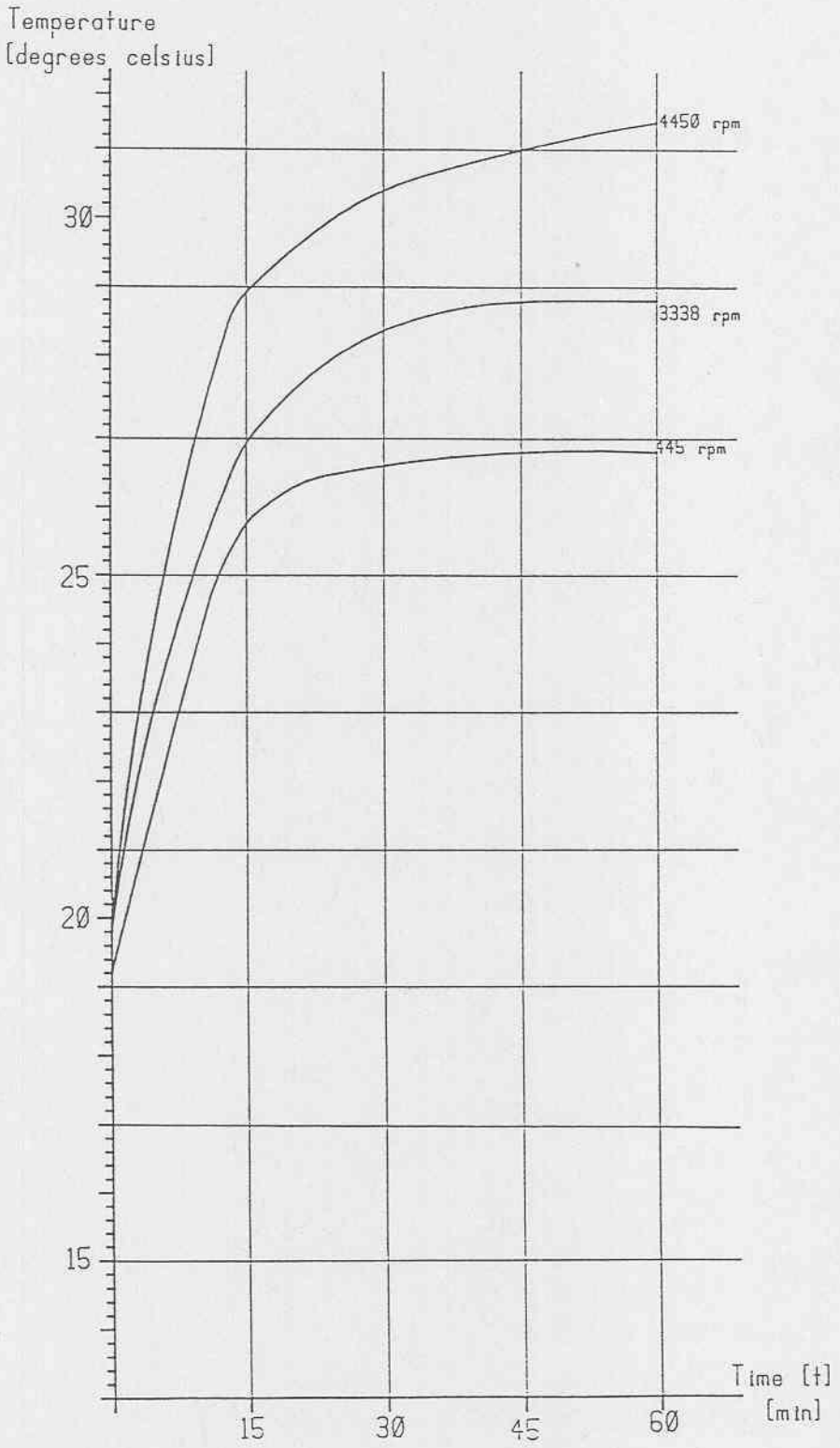


Chart #13

Model Z 320

Rotor 220.43 V01 Bucket 37.5039

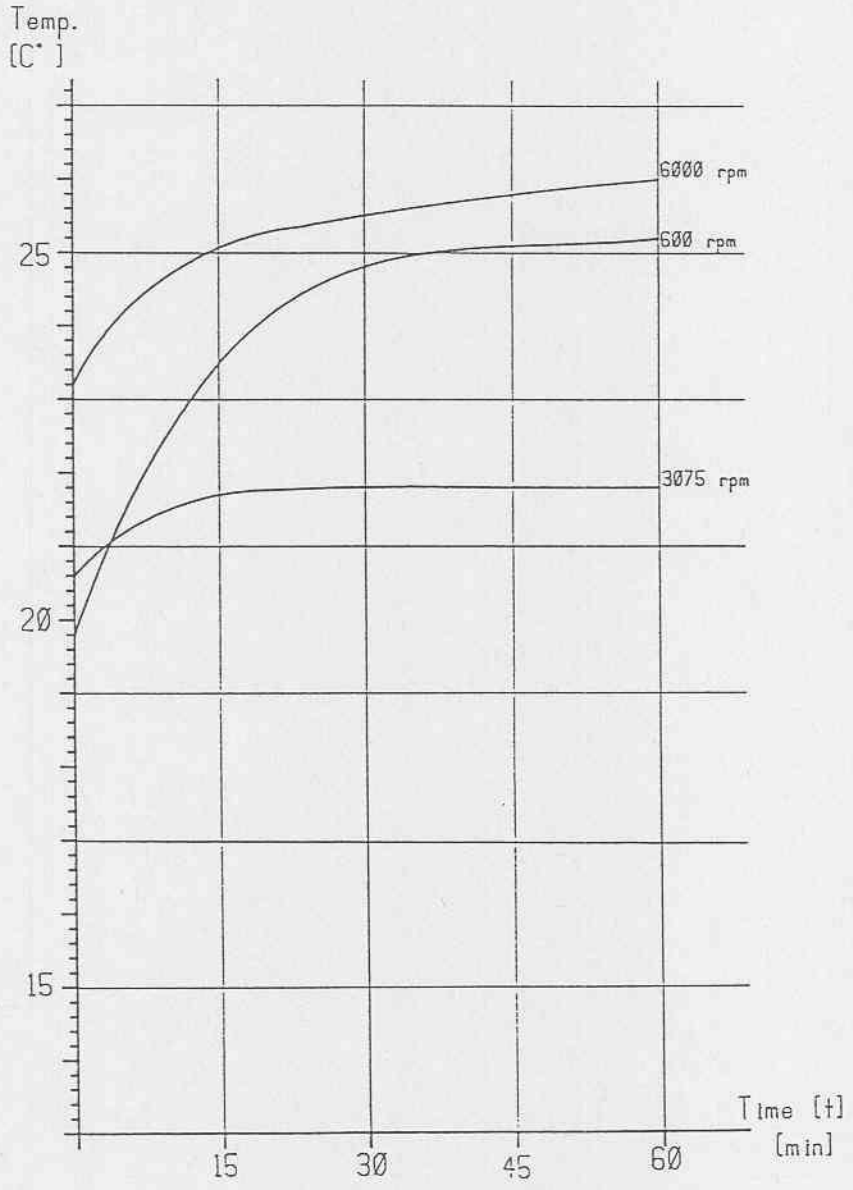
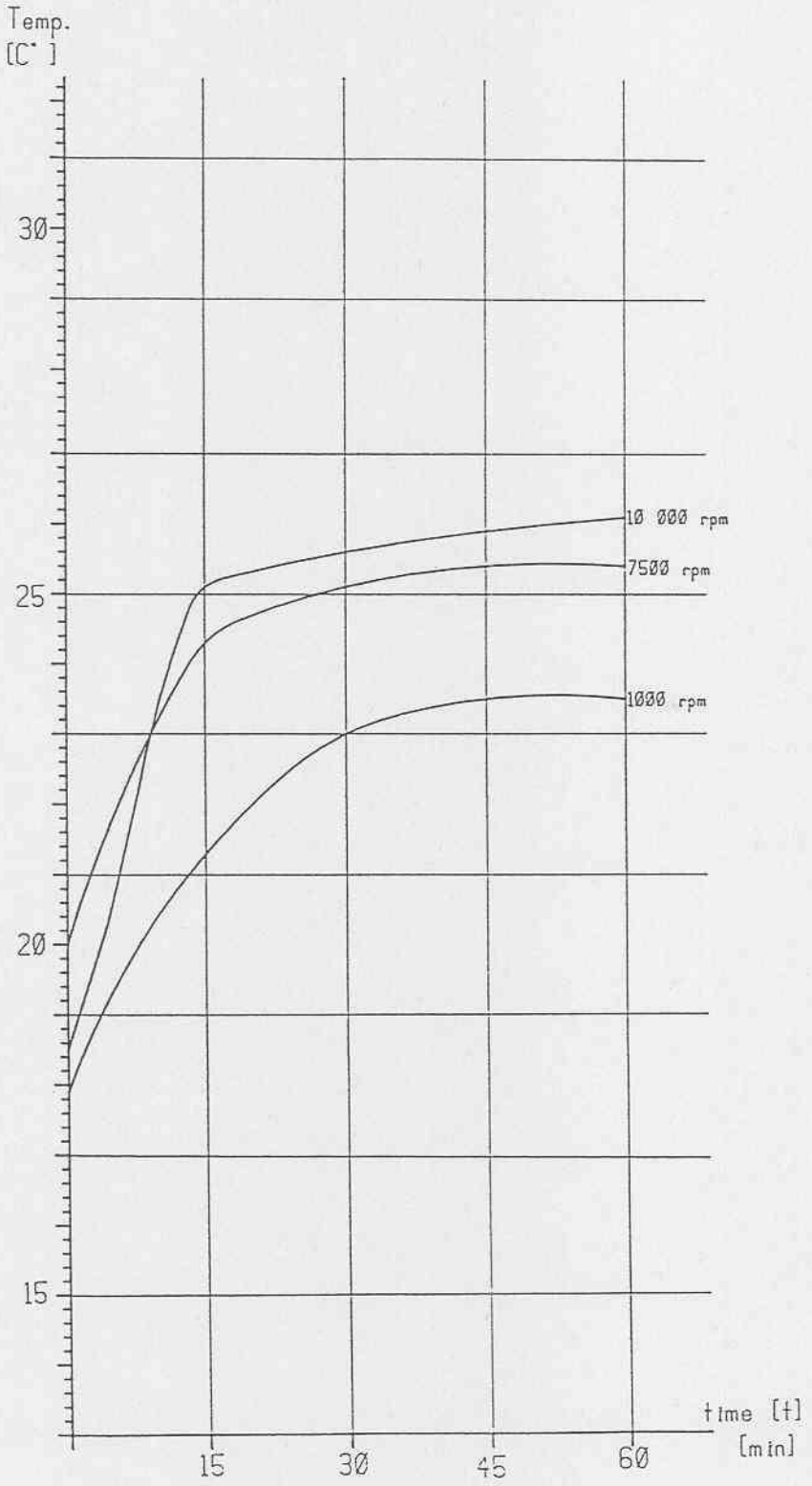


Chart #14

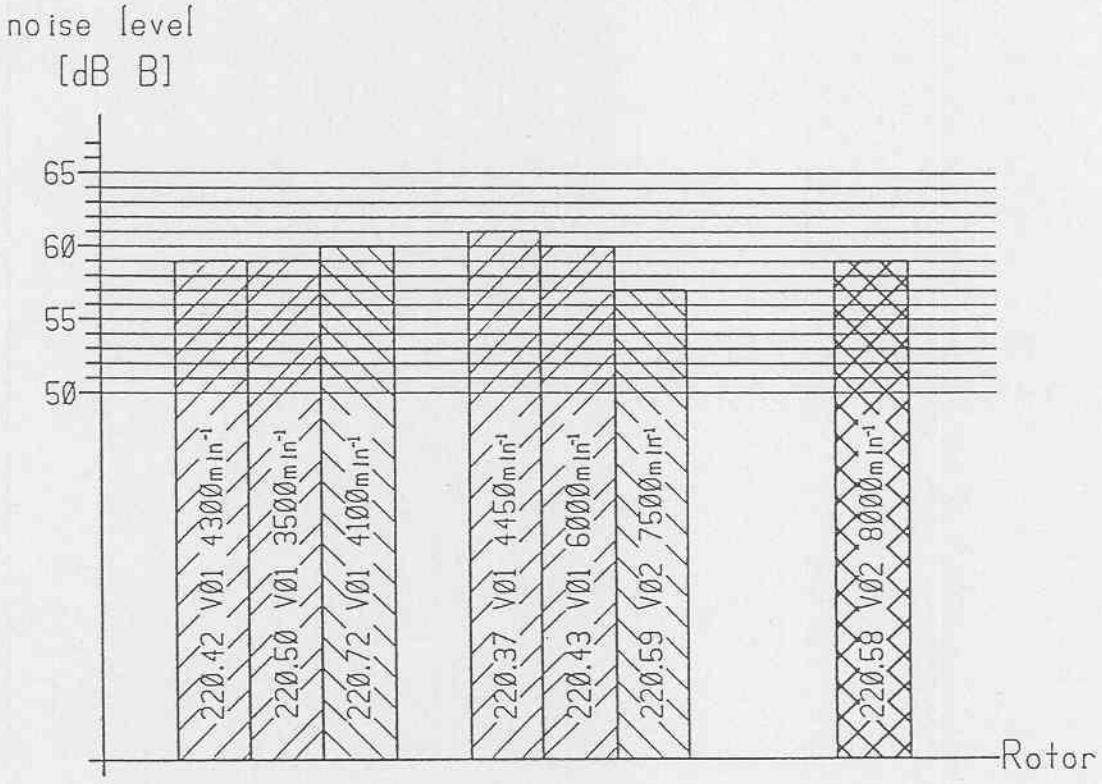
Model Z 320

Rotor 220.45 V01 Bucket 45.5060



noise level measurement Z320

Chart #15



FAULT	POSSIBLE REASON	SOLUTION
Centrifuge will not start - no indication on front panel.	No power supply. Defective fuse.	Check mains (power) and centrifuge fuses. Replace if necessary.
Lid cannot be released.	Defective lid lock.	Open manually (see 7.1)
	Lid lock is jammed.	Re-adjust lid lock.
	No power from PC board.	Call service.
Centrifuge cannot be started, although power is on.	Lid not closed correctly (white indicator lamp does not light).	Close lid correctly.
	No speed or time preselected.	Check and set the time.
	Fuse on front panel is defective.	Check fuses and replace if necessary.